REMARKS

Formal Rejections

While Applicant disagrees with the Examiner's objection to the prior amendment to the specification, Applicant amended the specification to remove the text previous added by amendment.

In response to the rejection of the specification and claims based on 35 USC 112, first and second paragraphs, Applicant amended claims 1 and 30 to recite reference to the exit of the separation channel, rather than to a "transition" which the Examiner's took issue with. Applicant submits that these amendments are supported by the original specification as filed, and introduce no new matter.

Referring to page 16, line 18 to page 17, line 5, it has been disclosed that as the analytes flow from the separation channel 504 of capillary column 22 into the collar 10, the analytes remain subject to the applied potential. As a result, the analytes continue to maintain separation state (i.e., in the form of a series of separate analyte bands) as they migrate/flow past the detection zone 20. Some mixing or diffusion of the analytes may occur in the collar near the exit of the separation channel 504, but analytes "regroup" into separated state as they continue down along the collar 10 (i.e., the detection section recited in claim 1 and 30) towards the detection zone 20. The detection zone 20 is preferably located at 100-500 x ID of the collar 10, more like 225 times the ID, to provide sufficient distance for the analytes to regroup before detection at the detection zone 20. Because the diameter of the detection zone is larger than the diameter of the separation channel 504, the analyte bands are narrower in the axial direction. Thus the detection resolution may be improved as a result.

Further, referring to the embodiment of Fig. 13, which clearly shows the flow from the narrower separation channel into the wider detection section. This embodiment clearly shows in no indefinite way the exit of the separation channel. This is the case with Fig. 13, as is also the case with Fig. 9B and Fig. 10B.

When viewed as a whole, Applicant respectfully submits that the "exit of the separation channel" is well defined in the specification to provide support to the claims pursuant to the requirements of the first paragraph of 35 USC 112, and reference to such in the claims would be definite, under the second paragraphs of 35 USC 112.

Prior Art Rejections

a. Taylor in view of Zhu

Taylor does not disclose the capillary having a widened section at the detection zone, but rather a capillary having a uniform width along its length, even at the detection zone.

Zhu does not make up for the deficiencies of Taylor. Zhu does not teach or suggest that the detection zone could or should be located at a distance 100 to 500 times of the width of the wider detection section, from the exit of the narrower separation channel, as required by the independent claims 1 and 30 as amended.

In fact, Zhu is silent in its written disclosure as to the location of the detection zone, much less disclose defining the detection zone to be at such a distance from the transition. Since there is no accompanying disclosure of the location of the tip of the fiber optic 3, one can and should only refer to what is specifically shown in the drawings in Zhu. Fig. 3 in Zhu shows the fiber optic 3 inserted into the increased inner diameter 1d of the bore 2, with the tip within 1 time of the increased diameter 1d from the transition from the smaller diameter. Fig. 3 does not

specifically or by implication show the tip to be at the recited distance in claims 1 and 30 as amended. Zhu did not address the concerns of mixing, diffusion and regrouping of analyte back into separated state, and accordingly Zhu would not have disclosed the specific location of the detection zone, without consideration of mixing, diffusion and regrouping of analytes.

Further, the location of the detection zone at the specific recited distance is not an obvious matter of design choice, since the motivation for such (e.g., to take into account of analyte mixing, diffusion and regrouping) is not found anywhere in Zhu. These considerations are beyond routine experimentation to determine optimum values. Without the teaching of the present invention, one skilled in the art would not know what parameters to optimize, and would not know to experiment to obtain optimum values.

Claim 1 has been amended to require that "mixing or diffusion of analytes occurs near the exit of the separation channel; means for introducing excitation radiation axially at a location along the detection section defining a detection zone as analytes pass the detection zone, said location being defined at a distance of 100 to 500 times the second width of the detection section from the exit of the separation channel, thereby allowing analytes sufficient distance to regroup from the mixing or diffusion near the exit of the separation channel, said means for introducing radiation including an optic fiber having an end in close proximity to the detection zone". Claim 30 has been amended in similar fashion.

Accordingly, even if Zhu can somehow be combined with Taylor, the combination would not result in the present invention defined in claims 1 and 30.

Furthermore, there is no motivation to combine Taylor and Zhu in the first place. Taylor discloses use of a fiber optic for **axial excitation** of the sample and does not disclose use of this fiber optic for axial detection. Rather, Taylor discloses off-column detection. In contrast to

Taylor, Zhu teaches use of a fiber optic for **axial detection** and teaches only off-column excitation. Zhu therefore conflicts with Taylor. There is no motivation found anywhere in either Taylor or Zhu, if and how **axial excitation** in Taylor can and should be modified with **axial detection** of Zhu. In fact, Taylor teaches away from Zhu. Axial excitation has the advantage of avoiding scattering of radiation at the walls of the detection section, which is otherwise experienced during off-column excitation (i.e., radiation directed from the side of the detection section). Any modification of Taylor based on Zhu would frustrate the objectives of Taylor.

However, the Examiner indicated in the Office Action that he referred to Zhu for the teaching of positioning a optical fiber in a widened section of the separation channel. The Examiner appears to have dissected the overall teaching of axial detection in Zhu, and selectively and conveniently adopted certain "useful" information from such dissection, to show that such structure may be readopted for another purpose, even though Zhu effectively teach away, expressly and by implication, from axial excitation. Such selectively and convenient adaptation of Zhu is only made possible given the benefit of the present invention.

Consequently, the modification of Taylor to adopt the axial detection scheme of Zhu using a widened detection section as suggested by the Examiner, can only be based on impermissible hindsight reconstruction made possible by the disclosure of the present invention.

Accordingly, the claims 1 and 30, and the claims dependent therefrom, are patentable over Taylor in view of Zhu.

b. Taylor in view of Yin

Yin shares similar deficiencies as noted above for Zhu. Yin is also not directed to axial radiation excitation.

Further, Yin discloses the use of a "flare" for receiving the interfacing end of the optical fiber, thereby facilitating the alignment and nonfixed confinement of the interfacing end of the optical fiber. As used in Yin, non-fixed coupling between an end of a microcolumn and an end of an optical fiber refers to the positioning and maintaining the position of these ends relative to each other in close proximity without rigidly affixing any of these ends to any mechanical structure (see column 4, lines 29+). Close proximity is for the purpose of preventing "excessive loss of light around the interfacing end 30 of the optical fiber yet large enough to not hinder fluid from exiting the micro-column. For example, this distance (i.e., the gap) can be from about 0.2 to 0.5 of the outside diameter of the smaller of the microcolumn 12 and the optical fiber 14". (See column 5, line 34+.) As in the case for Zhu, the tip of the optical fiber is to be within less than one time the increased diameter of the flare from the transition from the smaller diameter section, not a widened section that extends to over 500 times the width of the widen opening from the narrower section.

Further, the structure of the detection configuration in Yin dictates the close proximity o of the detection fiber end to the transition. Yin uses a larger channel 122 in Fig. 8, which is coaxial to the capillary column 124 and the optical fiber 114. There is coaxial flushing fluid flow around the capillary column124 and optical fiber 114. The analytes exit from the flare 139 of capillary column 124, into the flushing fluid flow in the larger channel 122. There would be significant analyte diffusion and mixing with the flushing fluid throughout the downstream flushing flow. Accordingly, regrouping of mixed or diffused analytes is not possible and hence not contemplated in view of the flushing fluid. Consequently, Yin is only concerned with maintaining the end of the fiber in close proximity to the flared end of the capillary column 124 to detect analytes before such mixing and diffusion occur in the flushing flow, in additional to

prevent excessive loss of light at the interface. It is not concerned with, and in fact need not be concerned with regrouping of analyte mixing and diffusion.

As in the case of Zhu, applicant respectfully submits that Yin in fact teaches away from the present invention defined in claims 1 and 16. For example, concerning the issues of analyte mixing, diffusion and regrouping, Yin does not even need to address these issues by simply placing the end of the optical fiber within 1 time of the increased diameter from the transition from the smaller diameter. By having the detection fiber end close to the transition, there would be significantly less opportunity for analyte mixing and diffusion, and hence regrouping at a significant distance from the transition is not needed.

Applicant respectfully submits that Yin is complete and functional in itself, so there would be no reason to modify Yin in the manner suggested only by the Examiner. Given that Yin chose to place the end of the optical fiber close to the transition, it does not make sense to modify Yin to have the end of the optical fiber at a significantly different distance from the transition. Any such modification of Yin would frustrate its intended purpose. It is clear that Yin and the present invention take mutually exclusive paths and reach different solutions for different problems solved (Yin deals with analytes in flushing flow which cannot be regrouped, as compared analyte regrouping in the present invention). Consequently, Yin teaches away (expressly or by implication) from the present invention. It would not be logical to modify Yin to obtain the present invention.

The other arguments presented in connection with Zhu but not specifically mentioned here are equally applicable to Yin.

Accordingly, Yin would not have rendered obvious the present invention defined in claims 1 and 30.

Other References

Given the traversal of independent claims 1 and 30 above, the further combinations of the other cited and applied references with Taylor and Yin and Zhu also would not render the present invention obvious. The other references do not make up for the deficiencies of Taylor, Yin or Zhu.

Double Patenting Rejection

In an earlier office action, the Examiner imposed a double patenting rejection and restriction requirement on a newly presented claim with respect to a copending application that is directed to axial detection. However, in the preceding office action, the Examiner has withdrawn the double patenting rejection in view of the arguments presented by Applicant.

However, in the present action, the Examiner again imposed a similar double patenting rejection with respect to the same copending application that is directed to axial detection. Applicant notes that the Examiner earlier imposed restriction requirement on the previously presented but withdrawn claim 34, which is also directed to axial detection.

Applicant submits that the claims in the present application are directed to incident axial excitation radiation, not axial detection of emitted radiation as in the pending claims in copending application no. 09/887,953. The claims in both copending applications could not be obvious over one another. The Examiner has not provided sufficient basis to support his view that it would have been obvious to one of ordinary skill in the art to incorporate the radiation in certain directions in order to optimize the measurement of the signal, when the present invention is directed to incident radiation, not detection of emitted radiation.

Applicant respectfully submits that it would be inconsistent to impose both restriction requirement and double patenting rejection with respect to the same subject matter (i.e., axial detection) of copending application 08/887,953, under the circumstances of the present application and the copending application. By nature of double patenting rejection, the claims of copending applications are deemed not patentably distinct from each other. On the other hand, by nature of restriction requirement, the restricted claim 34 is deemed to be directed to a patentably distinct invention. However, in this case, claim 34, by way of an earlier amendment, was essential copied from the copending application. (Applicant introduced claim 34 in the present application, merely to illustrate the inconsistencies noted here.) It would be inconsistent to find claim 34 to be patentably distinct from the rest of the claims pending in the present application, and yet find the same pending claims in the present application to be patentably similar to the copending application that claim the same subject matter as claim 34.

CONCLUSION

In view of all the foregoing, Applicant submits that the claims pending in this application are patentable over the references of record and are in condition for allowance. Such action at an early date is earnestly solicited. The Examiner is invited to call the undersigned representative to discuss any outstanding issues that may not have been adequately addressed in this response.

The Assistant Commissioner is hereby authorized to charge any additional fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this Response and associated documents but have not been enclosed, or to credit any overpayment to **Deposit Account No. 501288** referencing docket no. 1031/204.

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Respectfully submitted,

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